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25 JUN 2004

Mr. Bharat Mathur
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PPPO-01-580-04

NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP) RADIONUCLIDE EMISSIONS REPORT (CALENDAR YEAR 2003) FOR THE U.S. DEPARTMENT OF ENERGY'S PORTSMOUTH GASEOUS DIFFUSION PLANT, PIKETON, OHIO

Dear Mr. Mathur:

Enclosed please find a certified copy of the annual NESHAP report submitted in accordance with 40 CFR 61.94 (subpart H) for airborne emissions of radionuclides from the U.S. Department of Energy's (DOE's) Portsmouth Gaseous Diffusion Plant (PORTS) during calendar year (CY) 2003.

The PORTS site has operations conducted by two separate entities. DOE performs environmental restoration and waste handling activities while the United States Enrichment Corporation (USEC) maintains the enrichment facilities at PORTS in a "cold standby" status. The enclosed report addresses the emissions from DOE operations only; however, it also includes the total dose value associated with USEC operations conducted at PORTS. USEC will be submitting a separate report addressing the emissions from USEC operations. The combined dose to the most exposed individual resulting from both DOE and USEC operations was 0.04 millirem (mrem) for CY 2003, which is below the regulatory standard of 10 mrem per year.

If you should have any questions or need additional information, please contact me at (859-219-4000.

Sincerely,

William E. Murphie
Manager
Portsmouth/Paducah Project Office

Mr. Bharat Mathur PPPO-01-580-04

Enclosures

cc w/enclosure:
Administrative Records
Mike Murphy, USEPA/Region 5

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Gilbert D. Drexel, BJC/PORTS
Rosemary Richmond, BJC/PORTS

DOE/OR/11-3149&D1

Radiological National Emission Standards for Hazardous Air Pollutants (NESHAP) 2003 Annual Report for the Department of Energy Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

EQ Midwest, Inc.
contributed to the preparation of this document and should not be considered an eligible contractor for its review.

DOE/OR/11-3149&D1

Radiological National Emission Standards for Hazardous Air Pollutants (NESHAP) 2003 Annual Report for the Department of Energy Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Date Issued—June 2004

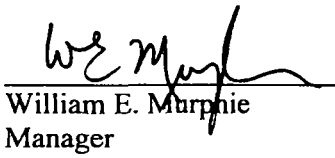
Prepared by
EQ Midwest, Inc.
Cincinnati, OH
under subcontract 23900-SC-SM002F

Prepared for the
U.S. Department of Energy
Office of Environmental Management

BECHTEL JACOBS COMPANY LLC
managing the
Environmental Management Activities at the
Paducah Gaseous Diffusion Plant Portsmouth Gaseous Diffusion Plant
under contract DE-AC05-03-OR22980
for the
U.S. DEPARTMENT OF ENERGY

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See, 18 U.S.C. 1001.



6/25/04

William E. Murphie
Manager
Portsmouth/Paducah Project Office
U.S. Department of Energy

Date

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ACRONYMS

CFR	Code of Federal Regulations
Ci	curie
DOE	U.S. Department of Energy
EDE	effective dose equivalent
EPA	Environmental Protection Agency
HEPA	high efficiency particulate
MEI	maximally exposed individual
mrem	millirem
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
pCi	picocurie
PORTS	Portsmouth Gaseous Diffusion Plant
USEC	United States Enrichment Corporation

EXECUTIVE SUMMARY

This report provides the information required by Title 40 of the Code of Federal Regulations (CFR) Part 61, National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart H, National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy (DOE) Facilities. The regulations, administered by the U.S. Environmental Protection Agency (EPA), require this annual report.

DOE is responsible for five unmonitored minor emission sources at the Portsmouth Gaseous Diffusion Plant (PORTS): the X-326 L-cage Glovebox, X-744G Glovebox, X-622 Groundwater Treatment Facility, X-623 Groundwater Treatment Facility, and X-624 Groundwater Treatment Facility. The X-622, X-623, and X-624 Groundwater Treatment Facilities are included because these facilities treat groundwater that is contaminated with radionuclides and are therefore sources of radionuclide emissions. The United States Enrichment Corporation (USEC) is responsible for additional sources associated with the gaseous diffusion process and other operations.

Radionuclide emissions from the DOE sources are modeled by the CAP88 computer program (approved by U.S. EPA) to determine the dose to residents living around the PORTS facility. In 2003, the X-744G Glovebox and X-326 L-cage Glovebox were not used; therefore, emissions from the X-622, X-623, and X-624 Groundwater Treatment Facilities were used to determine the dose.

In 2003, the effective dose equivalent (EDE) to the maximally exposed individual (MEI) based on DOE PORTS emissions was 0.0066 mrem/year. To determine compliance with NESHAP regulations, the DOE PORTS EDE is combined with the USEC EDE for each individual to determine a total EDE from the PORTS facility at each receptor location. The maximum USEC EDE in 2003 was 0.033 mrem/year and was the same location as the DOE MEI. The EDE to the MEI based on both USEC and DOE emissions was 0.040 mrem/year, which is below the NESHAP standard of 10 mrem/year.

Summary of the EDE (mrem/year) to the DOE and USEC MEI

MEI	Location [distance (meters), direction, and DOE source]	EDE from DOE sources	EDE from USEC sources	Combined EDE
DOE & USEC	2301 NE of X-622 1067 ENE of X-623 640 E of X-624	0.0066	0.033	0.040

DOE collects samples from 15 ambient air monitoring stations on and around the PORTS reservation and analyzes them for the radionuclides that could be present in ambient air due to PORTS activities. These radionuclides are isotopic uranium (uranium-233/234, uranium-235, uranium-236, and uranium-238), technetium-99, and selected transuranic isotopes (americium-241, neptunium-237, plutonium-238, and plutonium-239/240). The ambient air monitoring stations measure radionuclides released from the DOE and USEC point sources, fugitive air emissions, and background concentrations of radionuclides.

The CAP88 model was used to generate a dose conversion factor that was used to calculate a dose (in mrem/year) for a given activity of each radionuclide in air (in pCi/m^3). A dose was computed for each ambient air monitoring station. The net dose for each ambient air monitoring station (subtracting the dose measured at the background station) ranged from zero (at stations with a gross dose less than the background station) to 0.0014 mrem/year. The highest net dose measured at the ambient air monitoring

stations is 3.5% of the dose calculated from the combined DOE and USEC point source emissions (0.040 mrem/year). These results indicate that fugitive emissions of radionuclides from the PORTS reservation do not cause a significant unmeasured dose to individuals near the site and further demonstrate that emissions of radionuclides from PORTS are within NESHAP limits.

1. FACILITY INFORMATION

1.1 SITE DESCRIPTION

The Portsmouth Gaseous Diffusion Plant (PORTS) is owned by the U.S. Department of Energy (DOE). In 1992, Congress passed legislation amending the Atomic Energy Act of 1954 to create the United States Enrichment Corporation (USEC) to operate the uranium enrichment enterprise in the United States. The new corporation began operation on July 1, 1993 and privatized in 1998. In accordance with the Act, USEC leased all production facilities at PORTS and its sister plant at Paducah, Kentucky, from DOE. In June 2001, USEC ceased enrichment operations at PORTS. DOE reached an agreement with USEC to maintain the enrichment facilities at PORTS in cold standby status until further notice. This report covers only the DOE operations at PORTS.

DOE activities at the PORTS site include waste management, environmental restoration, environmental monitoring, and operation of nonleased facilities. Environmental monitoring consists of two major activities: effluent monitoring and environmental surveillance. Effluent monitoring is direct measurement or the collection and analysis of samples of liquid and gaseous discharges to the environment. Environmental surveillance is direct measurement or the collection and analysis of samples of air, water, and soil. Environmental monitoring is performed to characterize and quantify contaminants, assess radiation exposures to members of the public, demonstrate compliance with applicable standards and permit requirements, and detect and assess the effects (if any) of DOE activities on the local environment. Multiple samples are collected throughout the year and are analyzed for radioactivity, chemical content, and various physical attributes.

The PORTS site is located in sparsely populated, rural Pike County, Ohio, on a 16.2-km^2 (6.3-$mile^2$) site about 1.6 km (1 mile) east of the Scioto River Valley at an elevation of approximately 36.6 m (120 ft) above the Scioto River floodplain. The terrain surrounding the plant, except for the Scioto River floodplain, consists of marginal farmland and densely forested hills. The Scioto River floodplain is farmed extensively, particularly with grain crops.

Pike County has a generally moderate climate. Winters in Pike County are moderately cold, and summers are moderately warm and humid. The precipitation is usually well distributed with fall being the driest season. Prevailing winds at the site are out of the southwest to south. Average wind speeds are about 5 mph (8 km/h), although winds of up to 75 mph (120 km/h) have been recorded at the plant site. Usually, high winds are associated with thunderstorms that occur in spring and summer. Southern Ohio is within the Midwestern tornado belt, but no tornadoes have struck the plant site to date.

Pike County has approximately 27,700 residents. Scattered rural development is typical; however, the county contains numerous small villages such as Piketon, Wakefield, and Jasper that lie within a few kilometers of the plant. The county's largest community, Waverly, is about 19 km (12 miles) north of the plant site and has a population of approximately 4,400 residents. Additional population centers within 80 km (50 miles) of the plant are Portsmouth (population 20,909), Chillicothe (population 21,796), and Jackson (population 6,184) (2000 U.S. Census). The total population of the area lying within an 80-km (50-mile) radius of the plant is approximately 600,000.

1.2 SOURCE DESCRIPTION

DOE PORTS has five unmonitored minor stack sources regulated by the U S. Environmental Protection Agency (EPA) under the National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart H· the X-326 L-cage Glovebox, X-744G Glovebox, X-622 Groundwater Treatment Facility, X-623 Groundwater Treatment Facility, and X-624 Groundwater Treatment Facility.

The X-744G and X-326 L-cage Gloveboxes have airlocks for the entry and removal of work materials and are maintained under negative pressure during use. This negative pressure is produced by an exhaust fan drawing through a high efficiency particulate (HEPA) filter. Materials contaminated with radionuclides are sampled, batched, blended, or repackaged in the gloveboxes and generate low emissions of radionuclides. These gloveboxes were not used in 2003.

The X-622, X-623, and X-624 Groundwater Treatment Facilities treat groundwater contaminated with volatile organic compounds and radionuclides and release the treated water through permitted DOE PORTS National Pollutant Discharge Elimination System (NPDES) outfalls. The facilities consist of air strippers with offgas activated carbon filtration at X-623 and X-624 and aqueous-phase activated carbon filtration at X-622.

2. RADIONUCLIDE EMISSIONS

2.1 UNMONITORED SOURCES

Emissions from the X-622, X-623, and X-624 Groundwater Treatment Facilities are based on periodic air emissions testing. The most recent testing was completed from January through March 2001 (X-623 and X-624 facilities) and March 2002 (X-622 facility). Emissions from each facility are estimated by calculating the number of operating hours during 2003 for each facility and assuming that the highest emissions rate recorded for each radionuclide during air emissions testing was emitted during each hour of operation. Section 4.5 provides additional information concerning the emissions testing for each facility.

Hours of operation for each facility were calculated using the throughput for each facility (in gallons per minute) and the amount of water treated by each facility. The hours of operation for each facility in 2003 were 5994 hours (X-622), 2677 hours (X-623), and 1381 hours (X-624).

To reduce emissions from the groundwater treatment facilities, a de-mister is installed on the air stripper at X-622 and off-gas carbon units are installed on the air strippers at the X-623 and X-624 facilities.

Table 1 lists the activity of the selected air monitoring radionuclides released from the X-622, X-623, and X-624 Groundwater Treatment Facilities in 2003.

Table 1. Emissions (Ci/year) from DOE PORTS air emission sources in 2003

Radionuclide	X-622 Groundwater Treatment Facility		X-623 Groundwater Treatment Facility	X-624 Groundwater Treatment Facility
	Air stripper	Clarifier		
Americium-241	9.4E-08	4.8E-08	1.0E-06	1.3E-06
Neptunium-237	4.0E-08	7.0E-09	9.9E-07	1.9E-06
Plutonium-238	4.1E-08	1.4E-08	6.4E-07	9.0E-07
Plutonium-239/240[a]	2.6E-08	7.2E-09	5.6E-07	1.1E-06
Technetium-99	9.6E-07	9.2E-08	5.1E-05	6.1E-05
Uranium-233/234[a]	-	-	1.4E-06	1.8E-06
Uranium-234	2.8E-05[b]	1.9E-06[b]	-	-
Uranium-235	6.4E-08[b]	4.3E-09[b]	3.2E-07	6.4E-07
Uranium-236	-	-	4.3E-07	6.2E-07
Uranium-238	1.8E-07[b]	1.2E-08[b]	6.7E-07	9.0E-07
Total	2.9E-05	2.1E-06	5.7E-05	7.0E-05

[a]Plutonium-239/240 is entered as plutonium-239 and uranium-233/234 is entered as uranium-234 in the CAP88 model

[b]Emissions of uranium isotopes from the X-622 Groundwater Treatment Facility are calculated based on the concentration of total uranium detected during emission testing of this facility (see Sect 4 5 2 for further information)

There were no releases from the X-744G Glovebox or the X-326 L-cage Glovebox because the gloveboxes were not used during calendar year 2003

Table 2 lists the distances from the DOE PORTS air emission sources to the nearest public receptors as required by Title 40 of the Code of Federal Regulations (CFR) Section 61.94(b)(6).

Table 2. Distances to nearest public receptors from DOE sources

Distance in meters to the nearest					
Resident	School	Office/ Business	Farm		
			Vegetation	Meat	Milk
579 ESE	4180 NNW	2056 NW	579 E	610 ESE	5793 ENE

2.2 FUGITIVE AND DIFFUSE SOURCES

Fugitive and diffuse emissions include all emissions that do not pass through a discrete stack, vent, or pipe. Potential emissions of diffuse and fugitive emissions at PORTS include normal building ventilation, soil and groundwater remediation sites, and wastewater treatment facilities.

Ambient air monitors are used at PORTS to confirm that radiological emissions from the site produce a dose much less than the level allowed by regulations. The ambient air monitors are divided into three groups: on site, property line, and off site. One monitor is 13 miles southwest of the facility to measure background levels of radionuclides.

Samples are collected on a weekly basis from the monitoring stations. Samples are then composited into a monthly sample and analyzed for nine radionuclides representative of PORTS operations (americium-241, neptunium-237, plutonium-238, plutonium-239/240, technetium-99, uranium-233/234, uranium-235, uranium-236, and uranium-238). Section 4.3, Table 6, provides a dose estimate for each ambient air monitoring station based on the results of this ambient air sampling.

An evaluation of fugitive and minor air emission sources was completed in 2000 to determine whether the ambient air monitors around PORTS were properly located in order to assure that the monitors would sample radiological emissions from these sources. Seven fugitive sources (both USEC and DOE) were evaluated: X-745B Cylinder Yard, X-745C Cylinder Yard, X-745E Cylinder Yard, X-745F Cylinder Yard, X-745G Cylinder Yard, X-747G Cylinder Yard, and X-747H Scrap Metal Disposal Project. Four DOE minor air emission sources were included in the evaluation: X-326 L-cage Glovebox, X-744G Glovebox, X-623 Groundwater Treatment Facility (air stripper), and X-624 Groundwater Treatment Facility (air stripper).

An air dispersion model [Industrial Source Complex - Third Release (ISC3)] was used to determine the direction of the maximum ambient air quality impact from the fugitive and minor air emission sources listed in the previous paragraph. The evaluation concluded that the existing monitoring network provides adequate surveillance of the evaluated emission sources, with the exception of the X-747H Scrap Metal Disposal Project. The report recommended placement of an air monitor north-northwest of this project; the monitor, station T7, began operation in October 2000.

3. DOSE ASSESSMENT

3.1 DESCRIPTION OF DOSE MODEL

CAP88-PC Version 2, a computer program approved by EPA for compliance with 40 CFR Subpart H, was used to calculate the dose from DOE PORTS radionuclide emissions to air. The program uses a modified Gaussian plume equation to estimate the dispersion of radionuclides. The program computes radionuclide concentrations in air, rates of deposition on ground surfaces, concentrations in food, and intake rates to people from ingestion of food produced in the assessment area.

3.2 SUMMARY OF INPUT PARAMETERS

Input parameters for the CAP88 model include physical parameters for each radionuclide emission source, radionuclide emissions, meteorological data, and agricultural data. Table 1 (Sect. 2.1) provides the radionuclide emissions for each source. Default values were used for the size and class of each radionuclide. Table 3 provides the physical parameters for each source.

Table 3. Physical parameters for DOE air emission sources

Parameter	X-622 Groundwater Treatment Facility		X-623 Groundwater Treatment Facility	X-624 Groundwater Treatment Facility
	Air stripper	Clarifier		
Stack height (m)	8.1	8.1	7.6	6 1
Stack diameter (m)	0.2	0.1	0.2	0.2
Exit velocity (m/sec)	2.9	2.6	15.5	20.6

Site-specific meteorological data was used in the CAP88 model. Data collected for calendar year 2003 includes:

Annual precipitation:	118 cm/year
Average air temperature:	11.3 °C
Average mixing layer height:	1000 meters

The wind file used in the CAP88 model was also generated from data collected at the 30-meter height from the on-site meteorological tower.

Note that the default values provided with the CAP88-PC model can be very conservative. The rural food array used to estimate the DOE PORTS dose assumes that the public obtains all foodstuffs within 50 miles of the plant (see Table 4). In reality, the majority of the foodstuffs consumed are purchased at supermarkets that receive foodstuffs from all over the world.

Table 4. Agricultural data: rural default food array values

Fraction of foodstuffs from	Local area	Within 50 mi	Beyond 50 mi
Vegetables and produce	0.700	0 300	0.000
Meat	0 442	0 558	0.000
Milk	0.399	0 601	0 000

3.3 RESULTS

The CAP88-PC model calculated the 2003 maximum effective dose equivalent (EDE) for the maximally exposed individual (MEI) near PORTS based on emissions from DOE PORTS sources to be 0.0066 mrem/year. This EDE includes dose contributions from all of the radionuclides listed in Table 1.

In order to properly determine compliance with 40 CFR 61.92, EDEs to individuals based on USEC emissions should be combined with the DOE PORTS EDEs. In 2003, the maximum EDE for USEC was 0.033 mrem/year, as provided to DOE by USEC. DOE is not certifying the accuracy of the USEC data, calculations, or results.

The maximum EDE for the entire facility is calculated by adding the DOE and USEC EDEs at each receptor location. In 2003, the USEC MEI was at the same location as the DOE MEI. When the two EDEs are combined, the EDE for the combined MEI in 2003 is 0.040 mrem/year, which is substantially below the regulatory limit of 10 mrem/year. Table 5 summarizes the EDEs for the DOE, USEC, and combined MEIs.

Table 5. Summary of the EDE (mrem/year) to the DOE and USEC MEI

MEI	Location [distance (meters), direction, and DOE source]	EDE from DOE sources	EDE from USEC sources	Combined EDE
DOE & USEC	2301 NE of X-622 1067 ENE of X-623 640 E of X-624	0.0066	0.033	0.040

4. ADDITIONAL INFORMATION

4.1 NEW/MODIFIED SOURCES

No new facilities or modifications to existing facilities as defined under NESHAP regulations were initiated or completed at DOE PORTS during 2003.

Although the DOE PORTS ambient air monitoring stations are not sources of radionuclide emissions, DOE PORTS submitted a request to U.S. EPA in August 2003 to modify equipment at the ambient air sampling stations. The modification request was to install permanent duplicate sampling equipment on the low volume sampling train (the portion of the equipment used to sample fluorides) at each ambient air station. U.S. EPA approved this request in a letter to DOE dated December 1, 2003. The duplicate sampling equipment will be installed in 2004.

4.2 UNPLANNED RELEASES

There were no unplanned releases of radionuclides during 2003.

4.3 DOSE CALCULATIONS FOR EVALUATION OF DIFFUSE/FUGITIVE EMISSIONS

In October 2000, DOE assumed control of the ambient air monitoring stations at PORTS. Samples are collected weekly from 15 stations (see Fig. 1) and composited monthly. The ambient air monitoring stations measure radionuclides released from the DOE and USEC point sources (see Sect. 3), fugitive air emission sources such as those discussed in Sect. 2.2, and background concentrations of radionuclides.

Samples were analyzed for selected transuranics (americium-241, neptunium-237, plutonium-238, plutonium-239/240), technetium-99, and uranium isotopes (uranium-233/234, uranium-235, uranium-236, and uranium-238). Uranium-233/234 and uranium-238 were detected in all of the ambient air samples collected in 2003. Uranium-235 was detected in approximately half the samples collected during 2003. Uranium-236 was detected in one sample collected at four stations (A3, A23, A24, and T7) and in four samples collected at station A36. Americium-241 and neptunium-237 were not detected in any of the ambient air samples collected in 2003. Plutonium-238 was detected in one sample collected at station A9 and plutonium 239/240 was detected in one sample collected at station A10. Technetium-99 was detected once at five stations (A9, A12, A23, A41 and T7) and twice at station A36.

The CAP88 model was used to generate a dose conversion factor for each radionuclide. The dose conversion factor is used to compute a dose in mrem/year for a given activity of a radionuclide in air (in pCi/m^3). For radionuclides that were detected in ambient air, the dose for that radionuclide was calculated by using the maximum concentration of each detected radionuclide. For radionuclides that were never detected, the dose was calculated by using half the detection limit to calculate the maximum concentration of the radionuclide in air. The doses attributable to each radionuclide were then added to obtain the gross dose for each station. The net dose was obtained by subtracting the dose at station A37, the background monitoring station (the net dose is recorded as zero for stations with a gross dose less than the background station). Table 6 summarizes the total dose (both gross and net) for each station. The highest net dose for the ambient air monitoring stations was 0.0014 mrem/year at station A41.

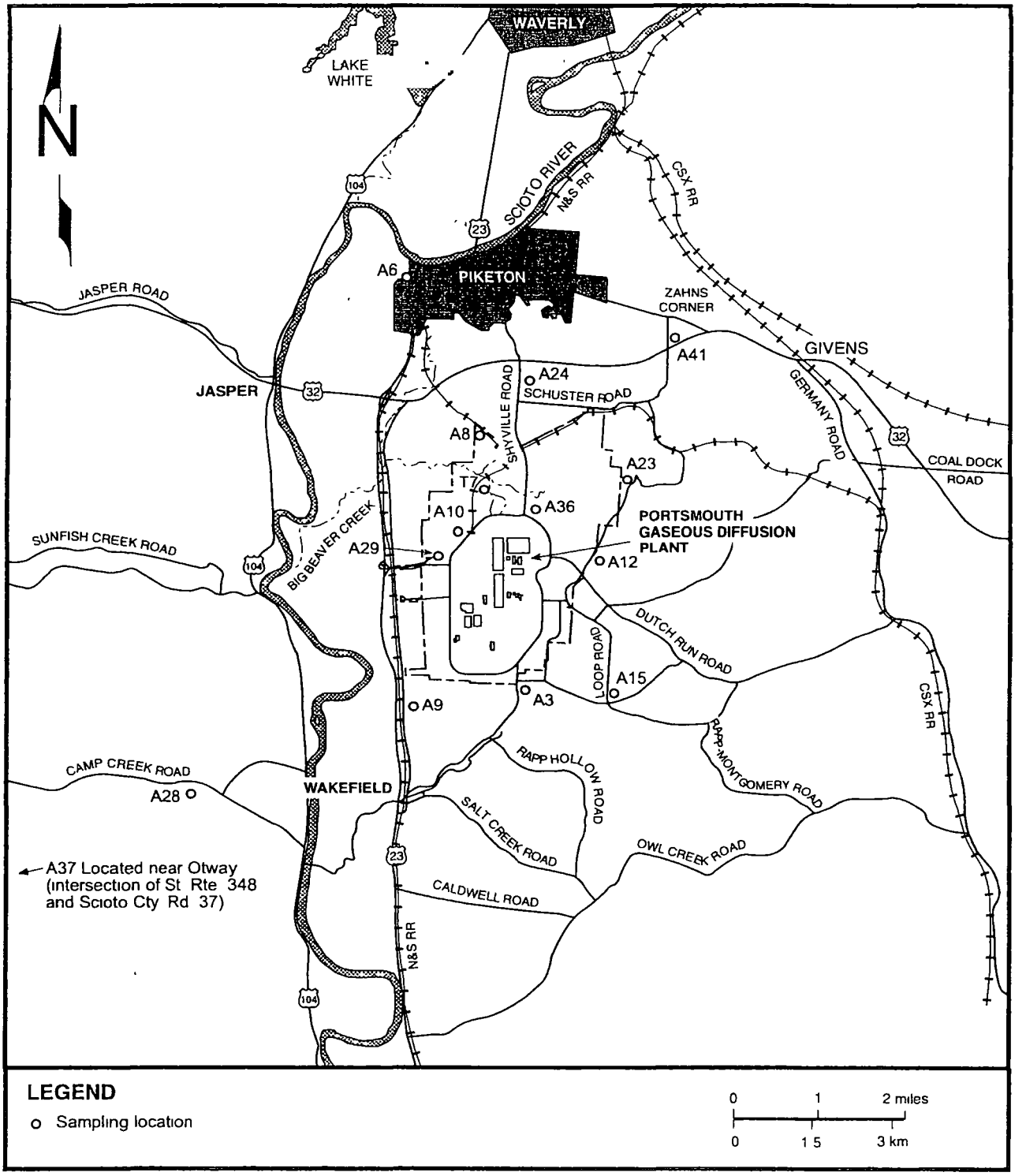

Fig. 1. DOE PORTS ambient air monitoring stations.

Table 6. Summary of doses (mrem/year) at ambient air monitoring stations

Station	Gross dose	Net dose	Station	Gross dose	Net dose
A3	2.8E-04	1 6E-04	A24	8.8E-05	0
A6	3.3E-04	2.1E-04	A28	3.5E-05	0
A8	2.9E-04	1.7E-04	A29	4 4E-04	3.2E-04
A9	1.4E-03	1.3E-03	A36	8.6E-04	7.4E-04
A10	1.0E-04	0	A37 (bkg)	1.2E-04	-
A12	5.7E-04	4.5E-04	A41	1.5E-03	1 4E-03
A15	1.7E-04	5.0E-05	T7	4.2E-04	3.0E-04
A23	5.2E-04	4 0E-04			

The highest net dose measured at the ambient air monitoring stations (0.0014 mrem/year) is 3.5% of the dose calculated from the combined DOE and USEC point source emissions (0.040 mrem/year). These results indicate that fugitive and point source emissions of radionuclides from the PORTS reservation do not cause a significant unmeasured dose to individuals near the site and further demonstrate that emissions of radionuclides from PORTS are within NESHAP limits.

4.4 DOSE CALCULATIONS FOR SECURITY FENCE LINE LOCATIONS

A dose calculation using the CAP88 model was also completed for locations around the perimeter of the security fence of the PORTS process area. Emissions from the DOE PORTS radionuclide sources (the X-622, X-623, and X-624 Groundwater Treatment Facilities) were used to determine the dose to a hypothetical person living at the security fence line at each of the 16 directional sectors around the plant (i.e., north, north-northeast, northeast, east-northeast, etc.). The maximum dose a person living at the PORTS security fence line would receive from DOE PORTS radionuclide emissions is 0.036 mrem/year at the south-southeast sector of the security fence line.

4.5 EMISSIONS TESTING AT THE GROUNDWATER TREATMENT FACILITIES

4.5.1 X-623 and X-624 Groundwater Treatment Facilities

Stack tests were completed at the X-623 and X-624 Groundwater Treatment Facilities during the first calendar quarter of 2001. Exhaust gas from the air strippers at these facilities was sampled during six separate tests in accordance with the applicable sections of 40 CFR Part 60, Appendix A, Method 29. Sampling was conducted during optimum operating conditions to assess worst-case emissions from the facilities.

Samples were analyzed for americium-241, neptunium-237, plutonium-238, plutonium-239/240, technetium-99, uranium-233/234, uranium-235, uranium-236, and uranium-238. All of the radionuclides were detected in at least one test except neptunium-237, which was not detected in any of the samples.

Emission rates in pCi/hour were calculated for each radionuclide for each of the six tests. For radionuclides that were not detected, half the detection limit was used to calculate the emission rate. Table 7 summarizes the maximum emission rate of each radionuclide from each groundwater treatment facility. These maximum emission rates were used to estimate the yearly emissions of each radionuclide from the facilities for inclusion in the CAP88 model (see Sect. 2.1, Table 1).

Table 7. Maximum emissions (pCi/hour) from 2001 stack testing at DOE PORTS X-623 and X-624 Groundwater Treatment Facilities

Radionuclide	X-623 Groundwater Treatment Facility	X-624 Groundwater Treatment Facility
Americium-241	3.8E+02	9.1E+02
Neptunium-237	3.7E+02	1.4E+03
Plutonium-238	2.4E+02	6.5E+02
Plutonium-239/240	2.1E+02	8.3E+02
Technetium-99	1.9E+04	4.4E+04
Uranium-233/234	5.3E+02	1.3E+03
Uranium-235	1.2E+02	4.6E+02
Uranium-236	1.6E+02	4.5E+02
Uranium-238	2.5E+02	6.5E+02

4.5.2 X-622 Groundwater Treatment Facility

Stack tests of the air stripper and clarifier at the X-622 Groundwater Treatment Facility were completed on March 26-27, 2002. Exhaust gas from the air stripper and clarifier at this facility was sampled during six separate tests (three of the air stripper and three of the clarifier) in accordance with the applicable sections of 40 CFR Part 60, Appendix A, Method 29.

Samples were analyzed for americium-241, neptunium-237, plutonium-238, plutonium-239/240, technetium-99, and total uranium. None of these radionuclides were detected in the samples, except total uranium, which was detected in the sample collected from the second test of the air stripper. According to the USEC PORTS Analytical Laboratory, which analyzed the samples collected during the stack tests, this detection should be considered a false positive based on a review of the raw sample data and the large total propagated error for the sample. As a conservative measure, however, the result for total uranium for this sample is used to calculate emissions as though uranium was detected in the sample

Emission rates in pCi/hour (americium-241, neptunium-237, plutonium-238, plutonium-239/240, and technetium-99) and μg/hr (uranium) were calculated for each radionuclide for each test of the air stripper and clarifier. For radionuclides that were not detected, half the detection limit was used to calculate the emission rate. Table 8 summarizes the maximum emission rate of each radionuclide from the air stripper and clarifier. These maximum emission rates are used to estimate the yearly emissions of each radionuclide from the facility for inclusion in the CAP88 model (see Sect. 2.1, Table 1). Emissions of uranium isotopes reported in Table 1 were calculated by assuming that total uranium is 94% uranium-238, 5.2% uranium-235, and 0.8% uranium-234. This percentage of uranium isotopes is based upon the highest enrichment of uranium produced by DOE PORTS in recent years, which is used for commercial power reactors.

Table 8. Maximum emissions from 2002 stack testing at DOE PORTS X-622 Groundwater Treatment Facility

Radionuclide	Units	Air stripper	Clarifier
Americium-241	pCi/hr	15 7	8.0
Neptunium-237	pCi/hr	6.6	1.2
Plutonium-238	pCi/hr	6.9	2.3
Plutonium-239/240	pCi/hr	4.4	1.2
Technetium-99	pCi/hr	160.8	15.3
Uranium	μg/hr	95.3	6.4

5. SUPPLEMENTAL INFORMATION

5.1 COMPLIANCE WITH 40 CFR 61 SUBPARTS Q AND T

Title 40, Part 61, Subpart Q of the Code of Federal Regulations addresses radon emissions from DOE facilities, and 40 CFR Part 61 Subpart T addresses radon emissions from disposal of uranium mill tailings. DOE PORTS does not have and does not expect to have any radon-220 emissions due to uranium-232 or thorium-232 sources. DOE PORTS does not manage any uranium-232 and consequently does not have any emissions of radon-220 due to uranium-232 decay. Although DOE PORTS does not specifically manage thorium-232, some amount must be present due to uranium-236 decay. Uranium-236 is itself a trace component of the uranium managed at DOE PORTS, and its thorium daughter is extremely long-lived (half-life greater than 14 billion years). These figures indicate that no measurable concentrations of radon-220 due to thorium-232 decay will exist on site within any foreseeable future.

The uranium processed at PORTS has previously been chemically purified to remove other naturally occurring elements including radium-226, which is the precursor of radon-222. It has been calculated that 10,000 years would be required before detectable levels of radon-222 would occur due to the natural decay process.

5.2 REGULATORY INSPECTIONS

No NESHAP inspections of DOE PORTS were conducted during 2003.

5.3 COMPLIANCE WITH NESHAP SUBPART H EFFLUENT MONITORING REQUIREMENTS

DOE PORTS does not operate any continuous emission monitors (samplers) on any point or stack sources within the DOE operations at PORTS. USEC operates continuous emission monitors on several of the point or stack sources within the USEC operations at PORTS.

Section 4.3 discusses the results of the DOE ambient air monitoring program. Ambient air monitoring appears to be the only feasible means for assessing emissions from fugitive and diffuse sources.

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